

FIG. 1

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Summary of sequence differences between the infectious  
cDNA clone and parental WNV strain 3356

Nucleotide no. <sup>a</sup>	Strain 3356 genome	cDNA clone	Amino acid change	Location
1285	T	C	Silent	E
3840	T	C	Silent	NS2A
7015	C	T	Silent	NS4B
7826	T	C	V → A	NS5
8067	G	A	Silent	NS5
8859 <sup>b</sup>	C	A	Silent	NS5
8862 <sup>b</sup>	A	G	Silent	NS5
8880 <sup>c</sup>	A	G	Silent	NS5
9123	C	T	Silent	NS5
10613	C	T	Silent	3'UTR
10783	C	T	Silent	3'UTR

<sup>a</sup> Nucleotide position and sequence are based on WNV strain 3356 (GenBank accession no. AF404756).

<sup>b</sup> Mutations were designed to generate an endonuclease *StyI* site as a marker for recombinant virus.

<sup>c</sup> This mutation was designed to knock out the endonuclease *EcoRI* site as a marker for recombinant virus.

FIG. 2

Genome  
Transcript

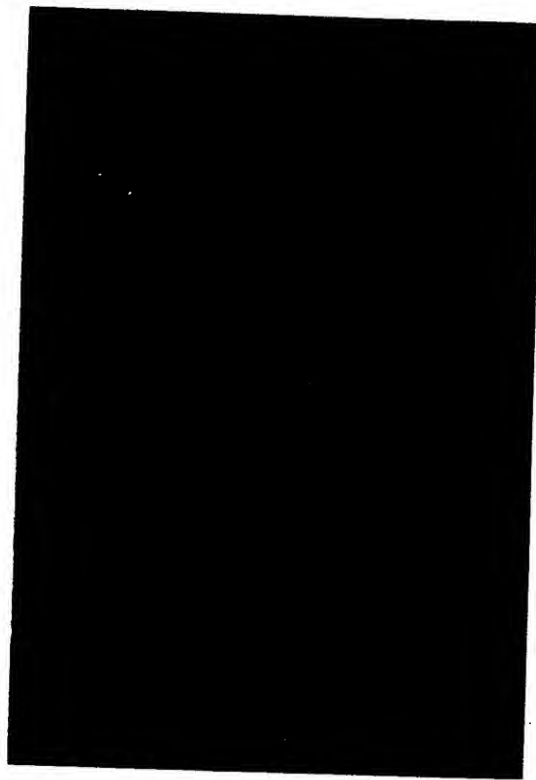


FIG. 3

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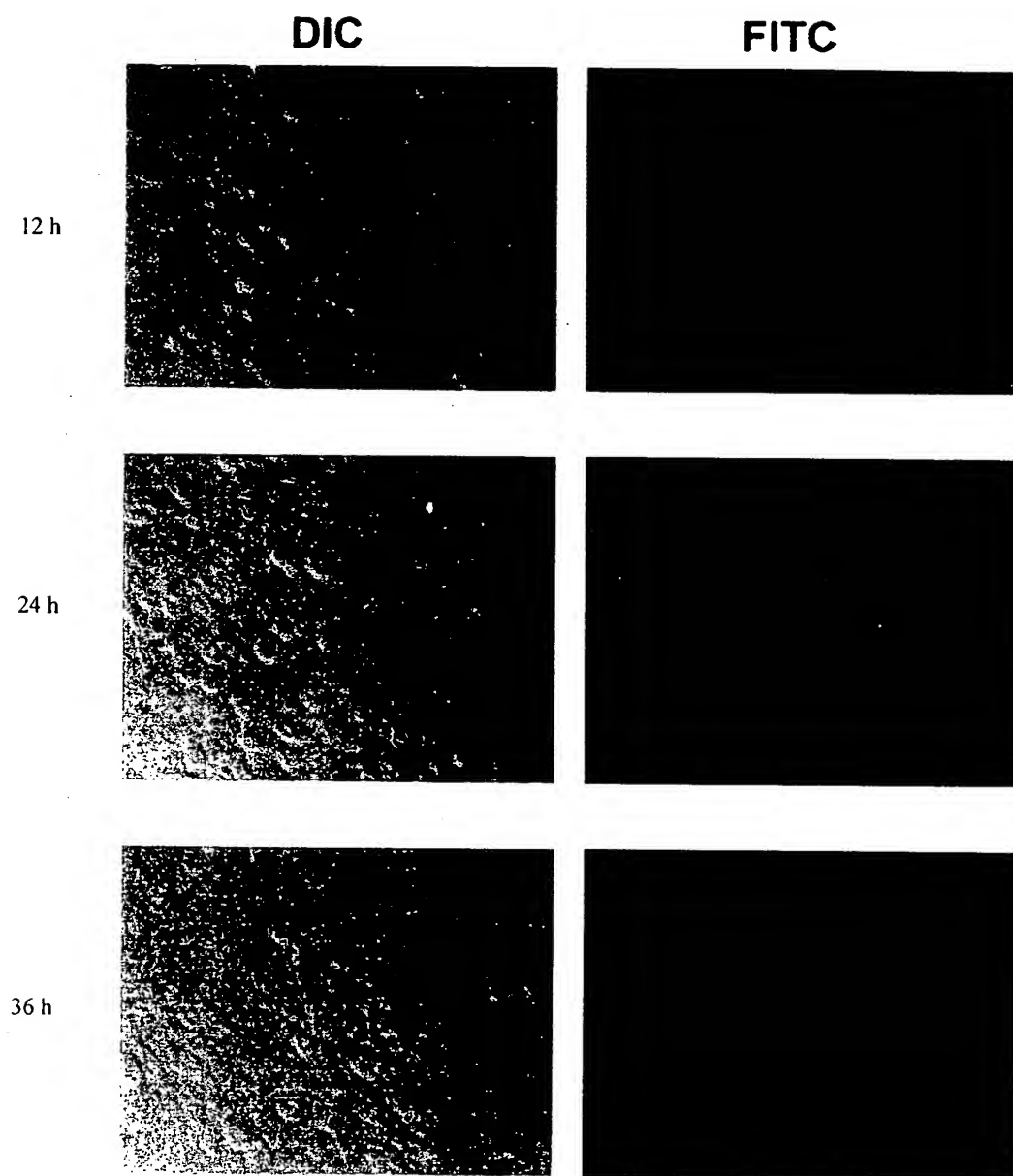


FIG. 4

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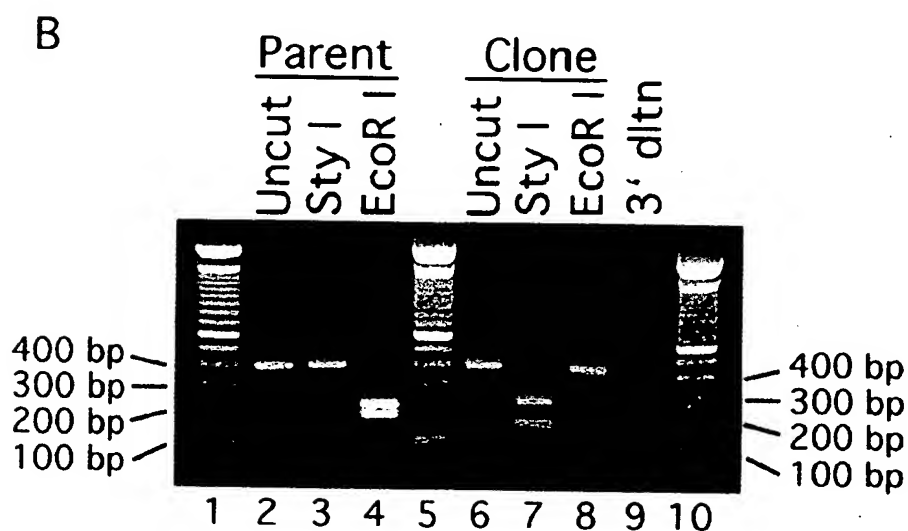
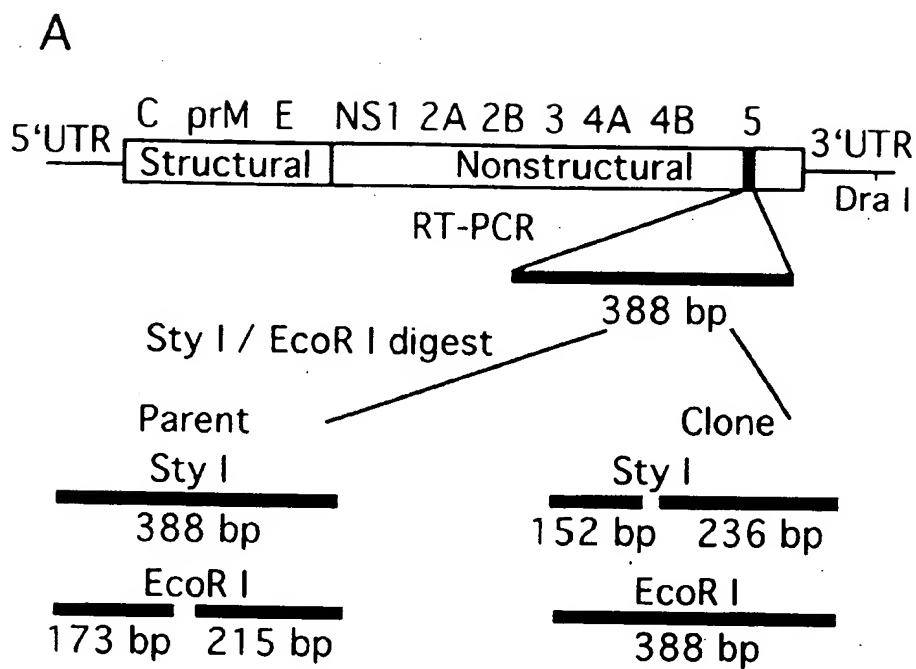


FIG. 5

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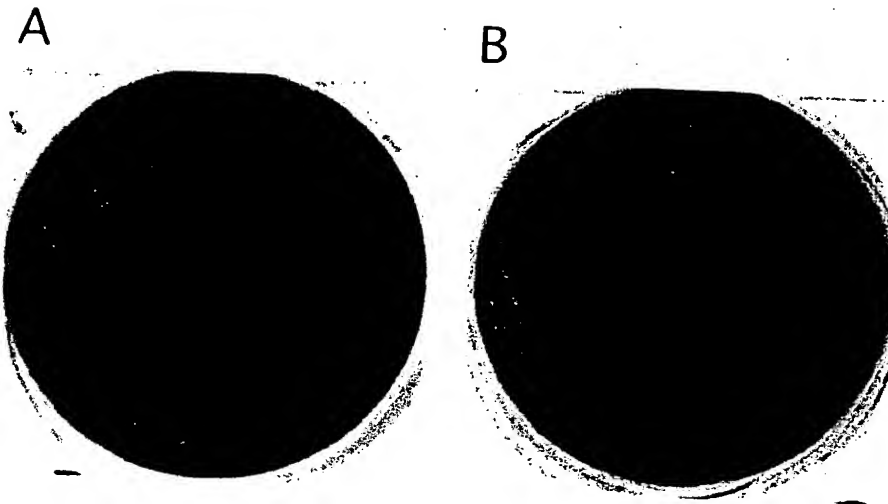


FIG. 6

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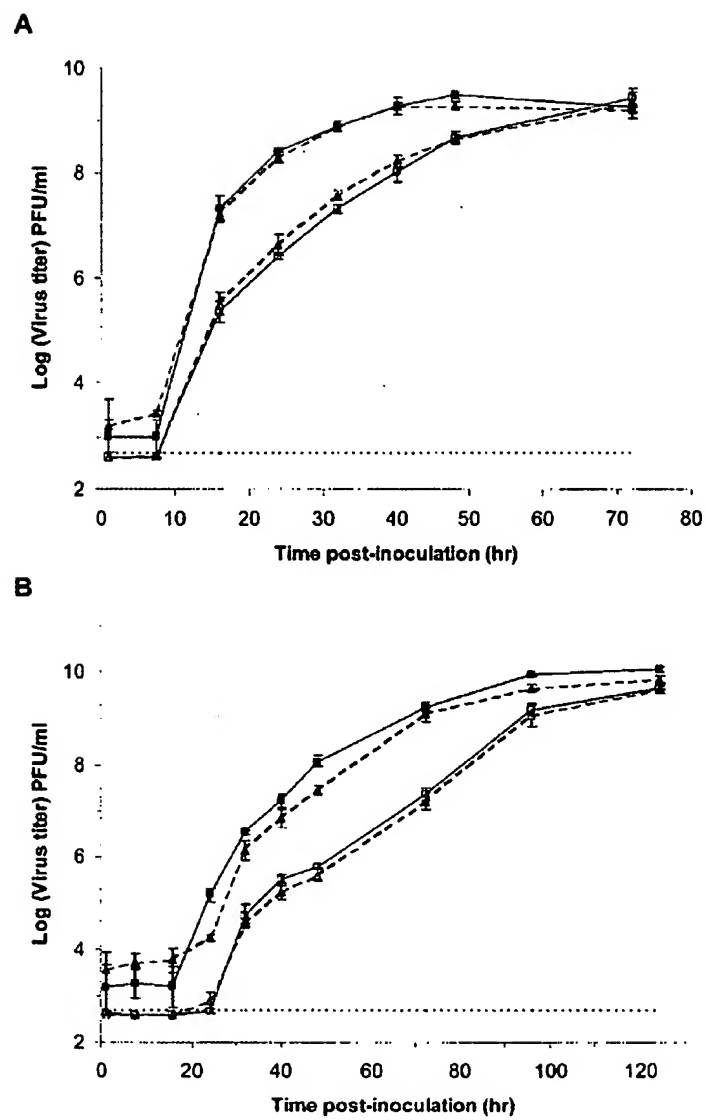


FIG. 7

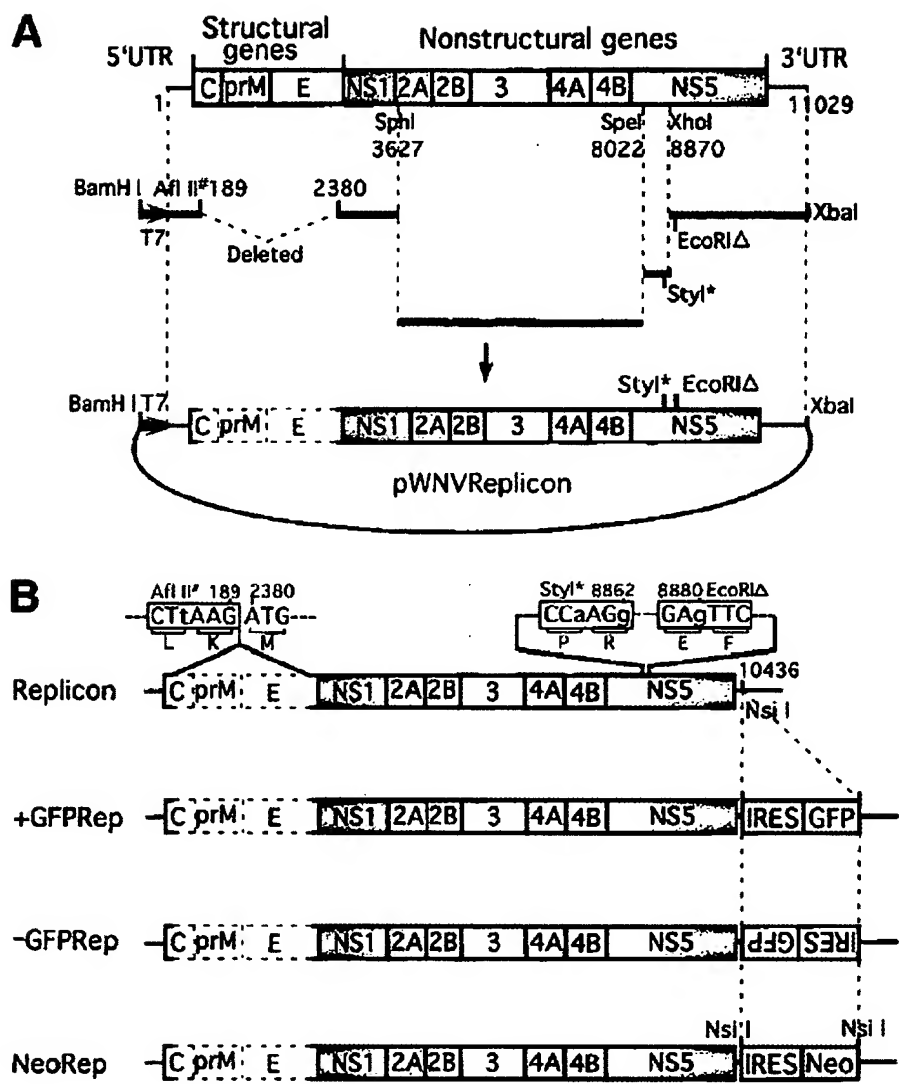


FIG. 8



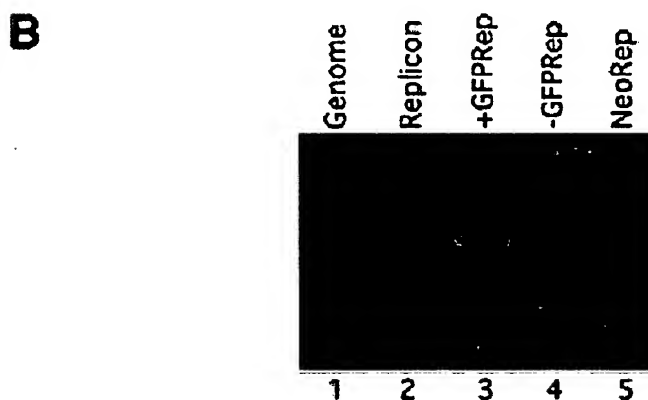
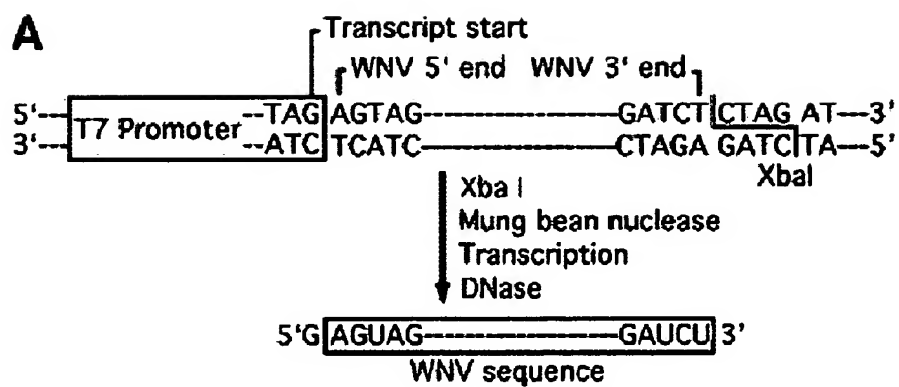


FIG. 9

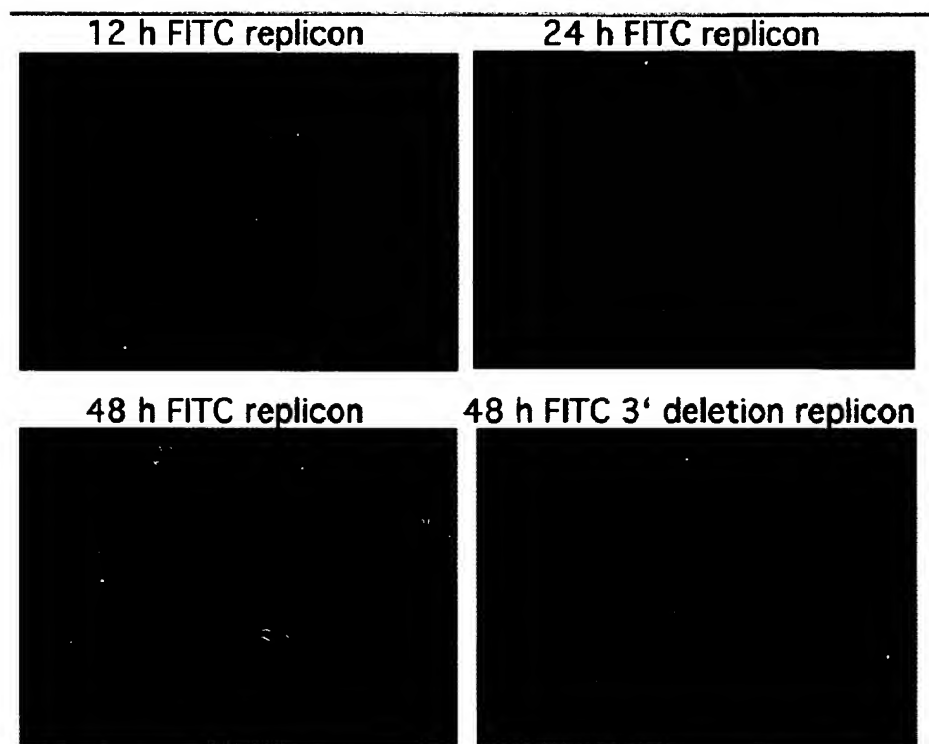


FIG. 10

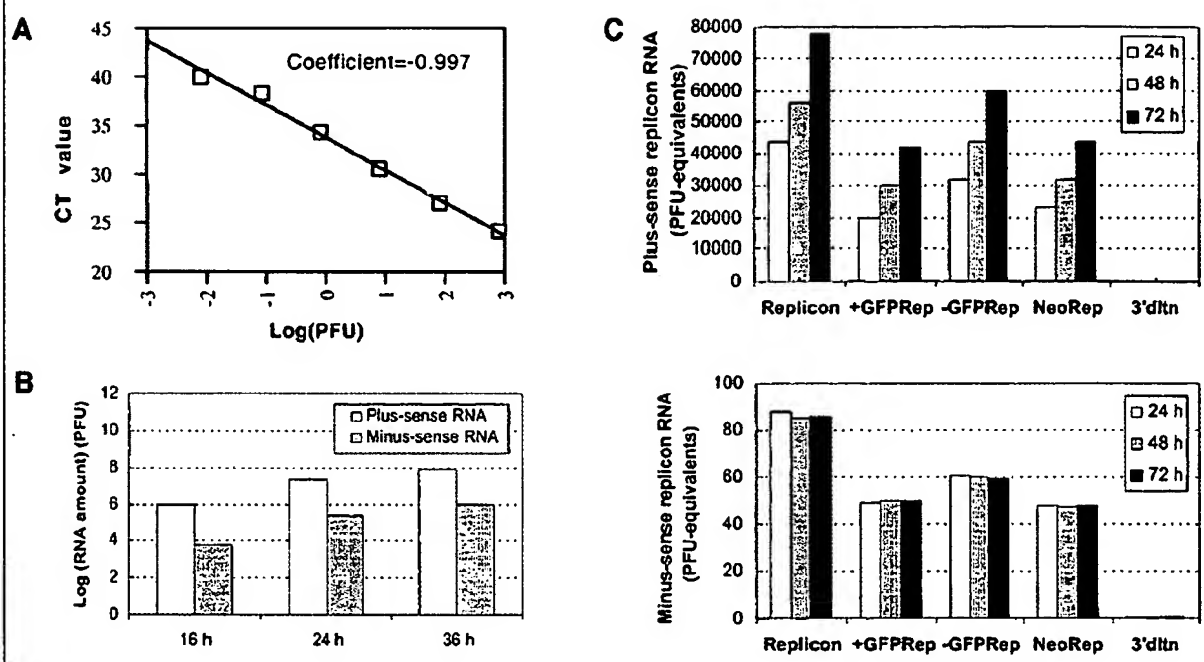


FIG. 11

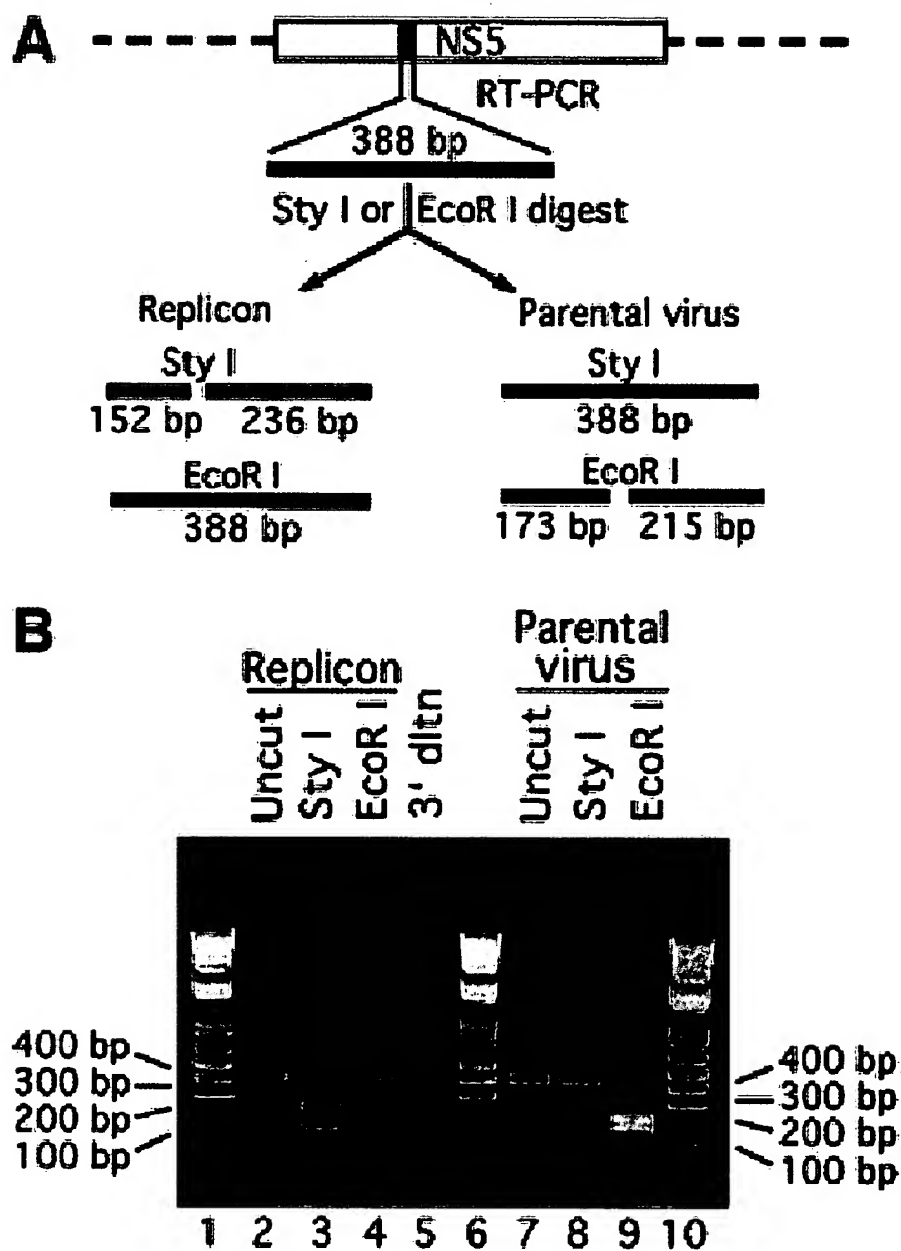


FIG. 12

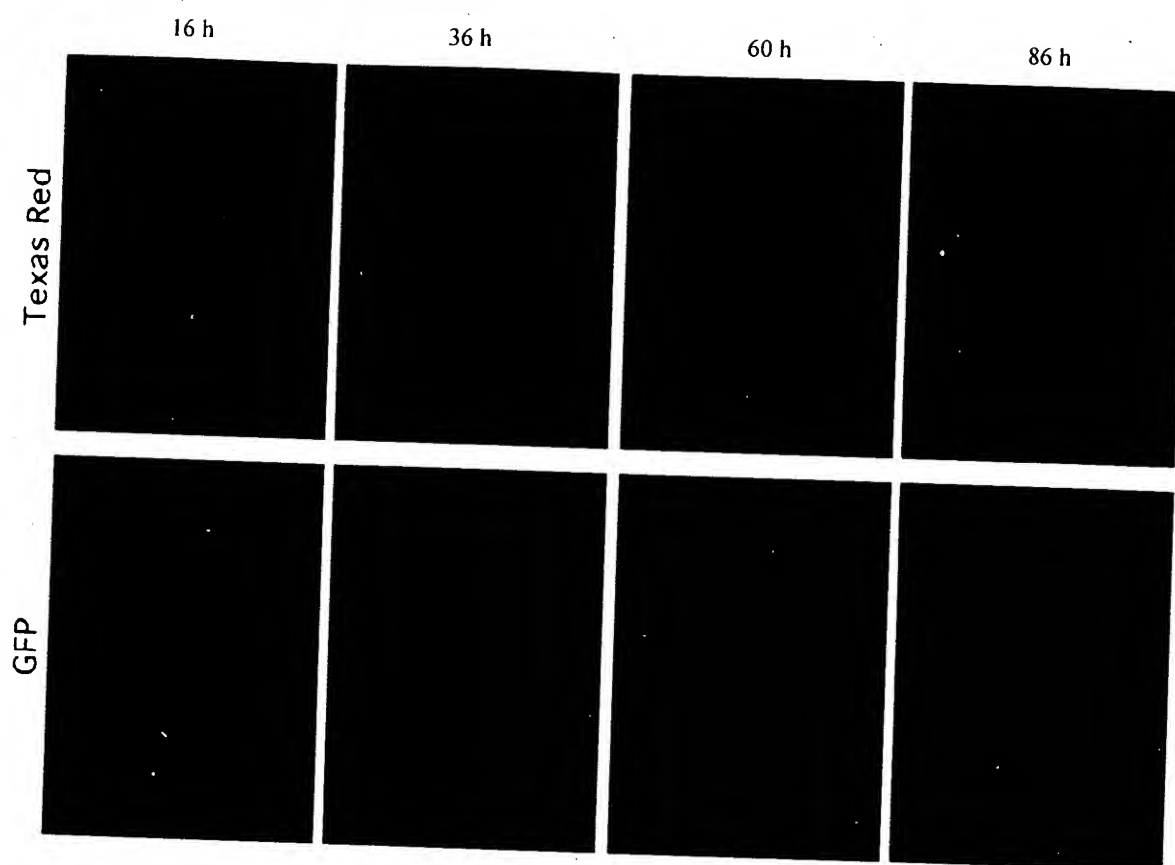


FIG. 13

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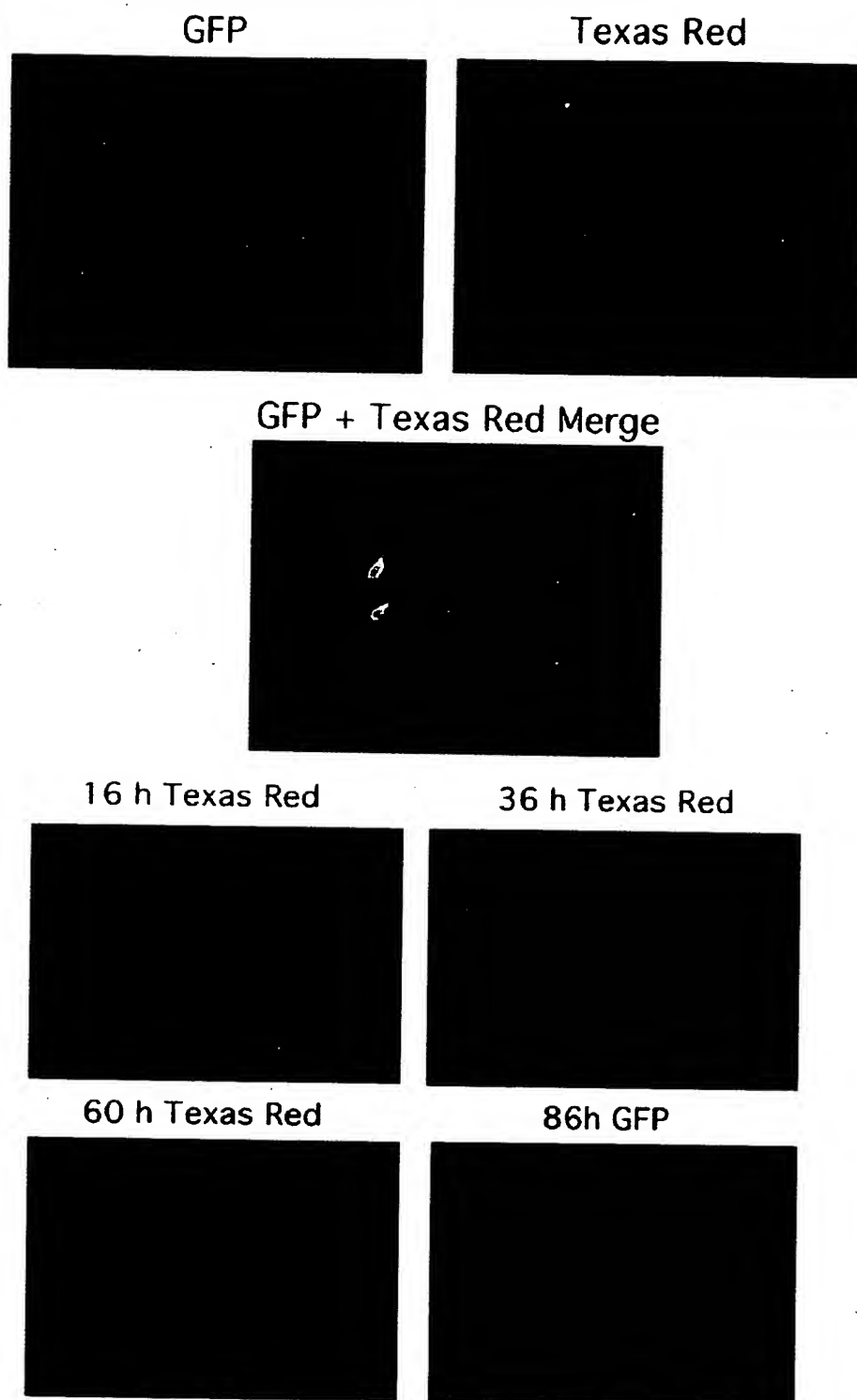
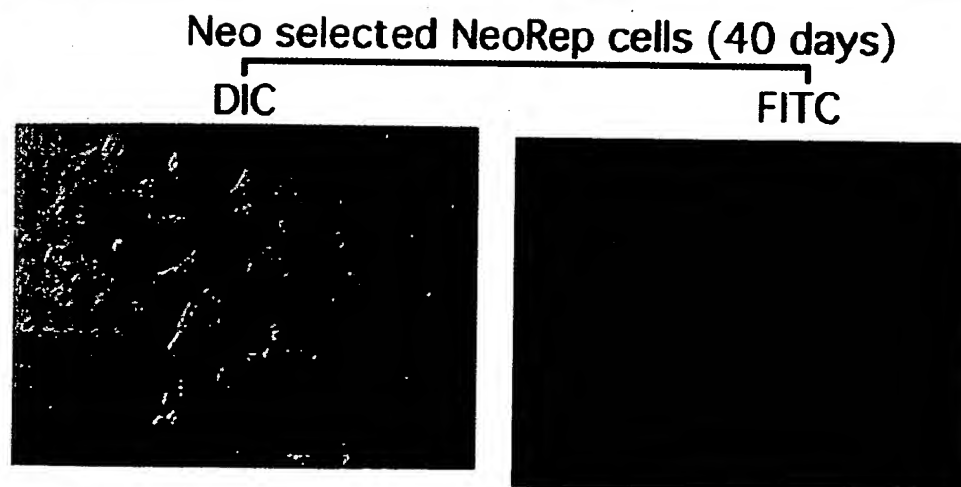
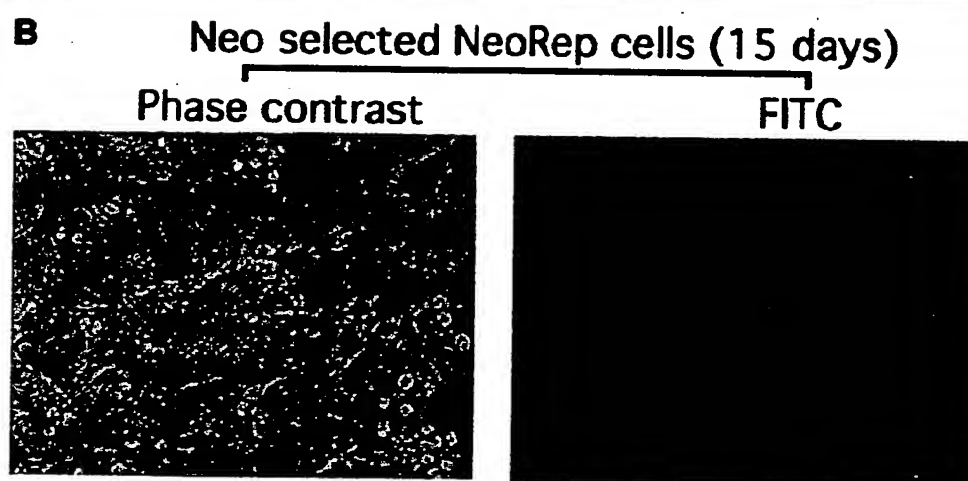
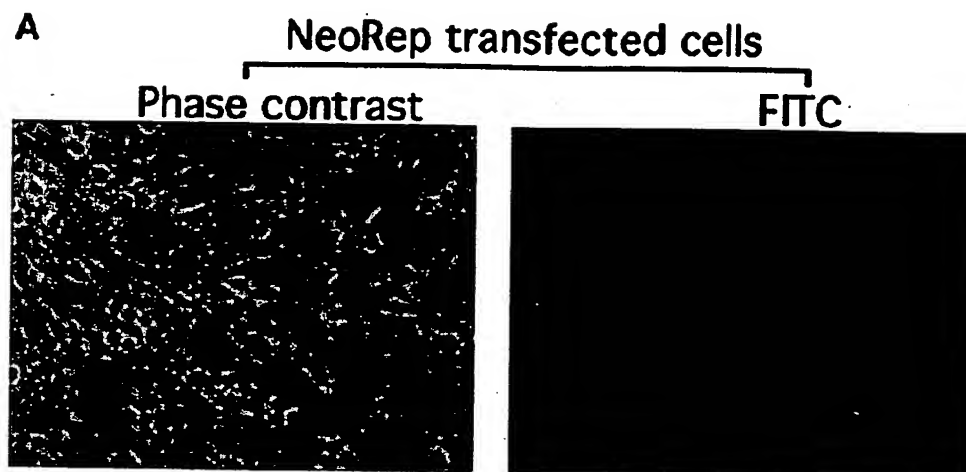


FIG. 14

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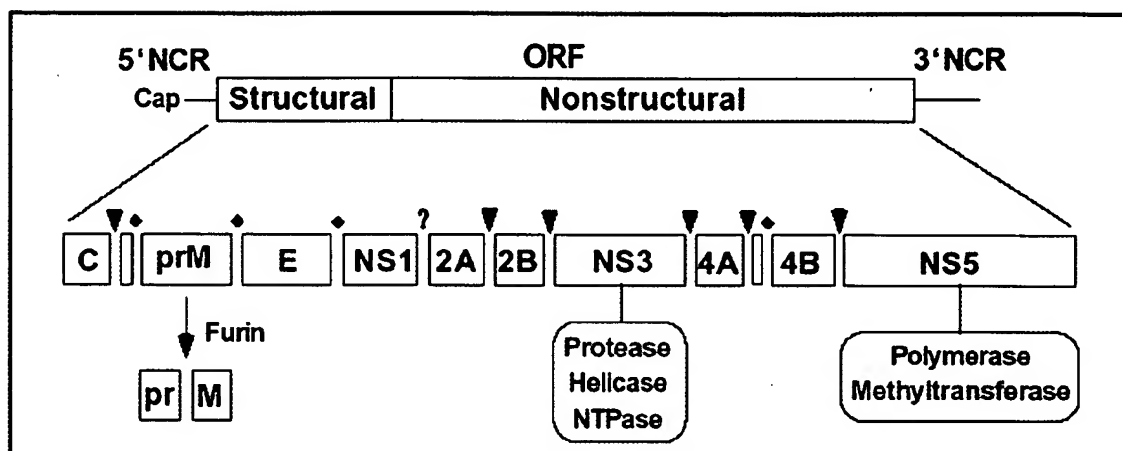


FIG. 16



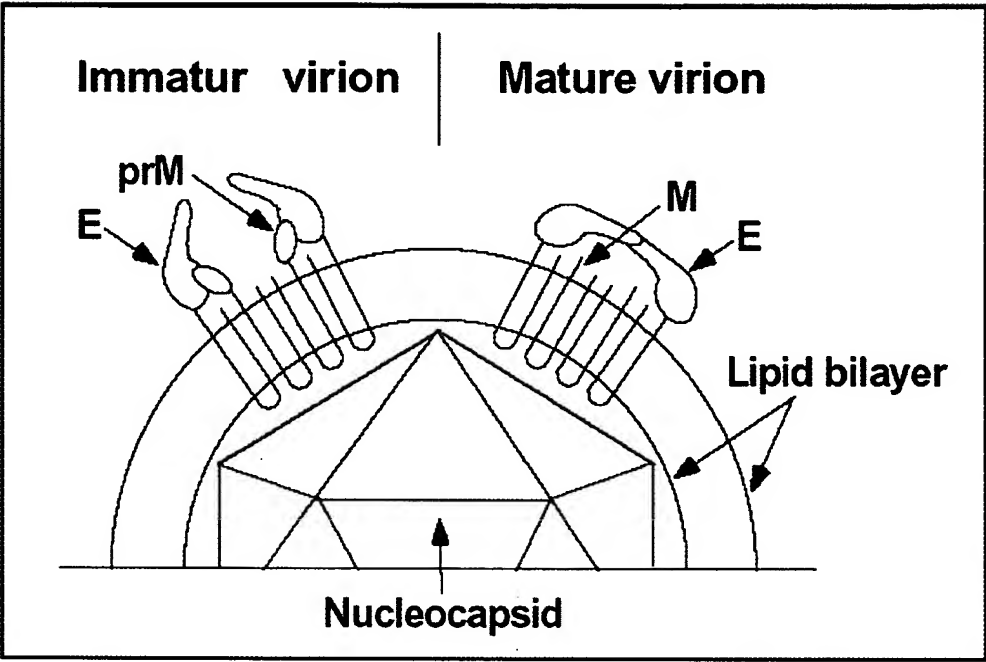


FIG. 17

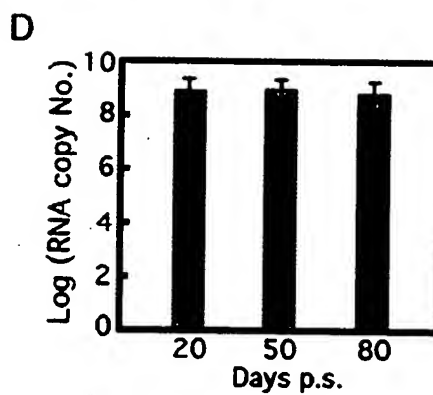
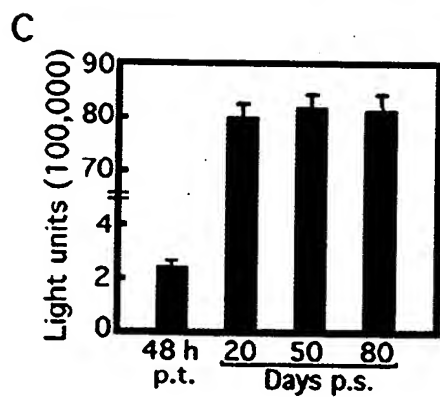
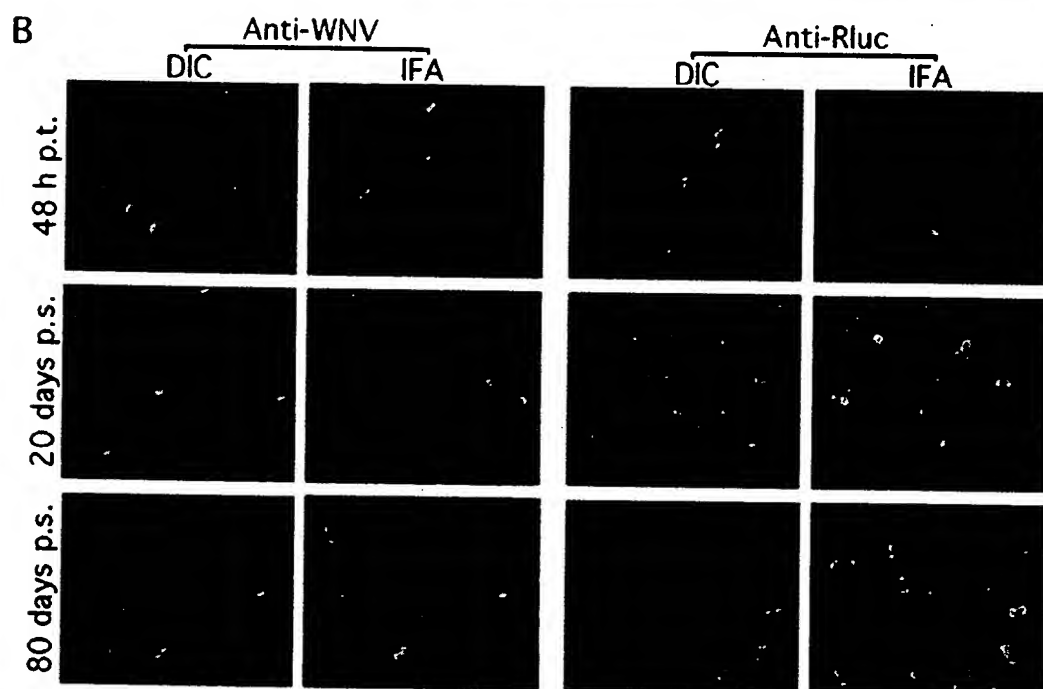
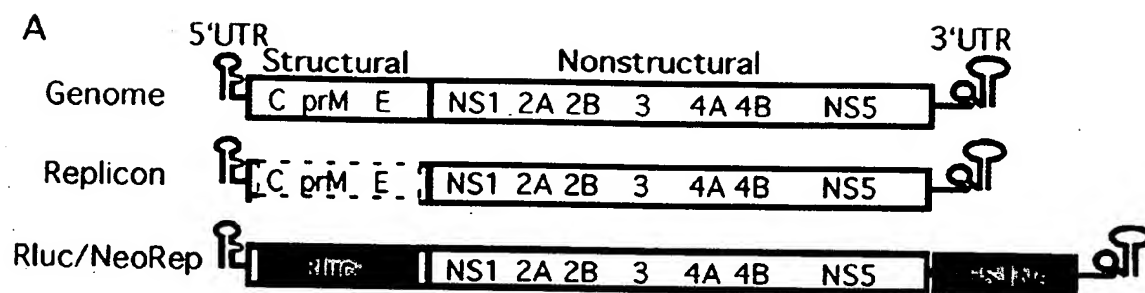


FIG. 18

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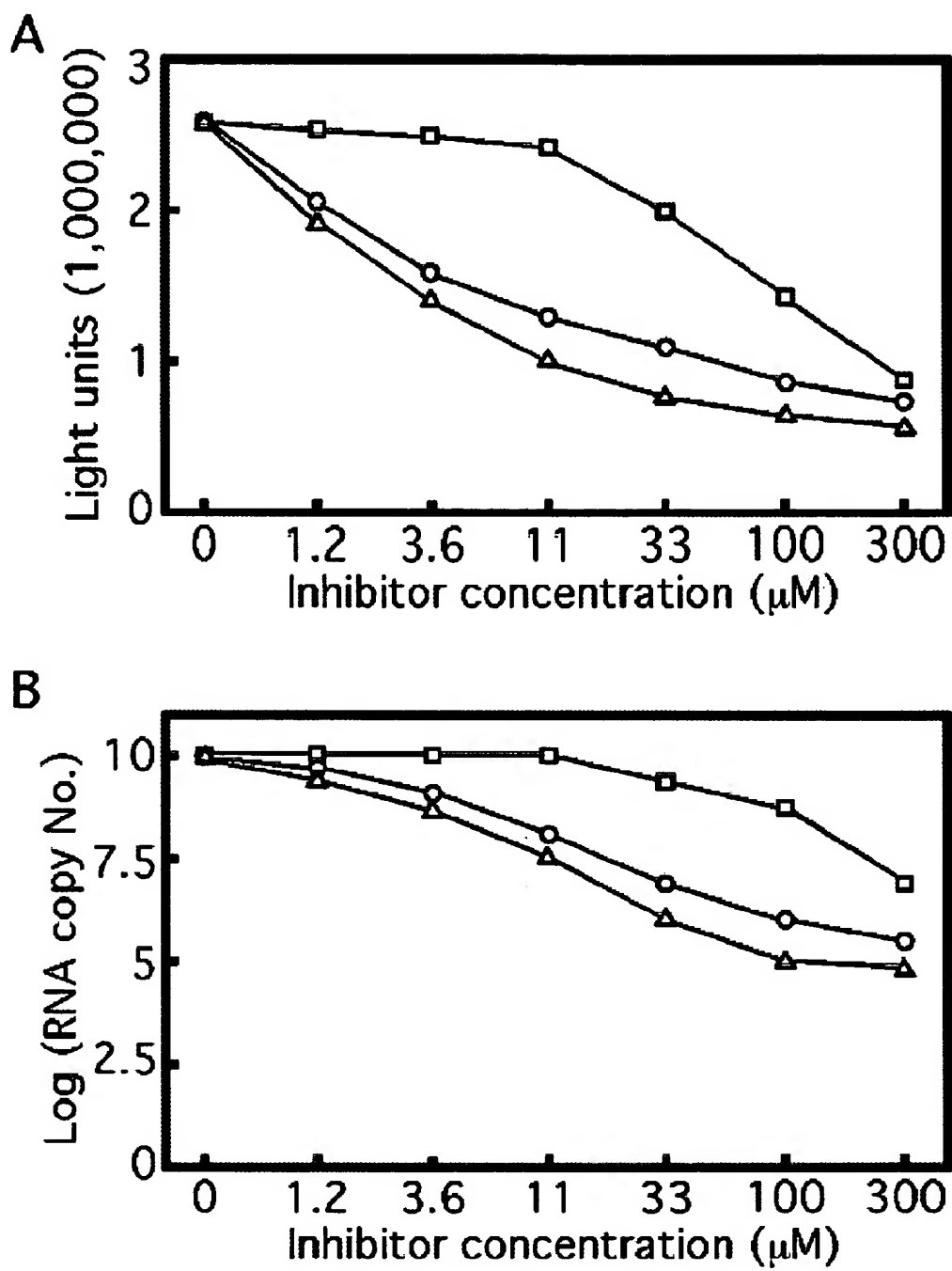


FIG. 19

**Complete Nucleotide Sequence of Lineage I WNV Strain 3356 GenBank accession N. AF404756**  
*(Nucleotide positions indicated in bold underline are different than corresponding positions of FIG. 2)*

FIG. 20 a

1	agtagttcgc	ctgtgtgagc	tgacaaactt	agtagtggtt	gtgaggatta	acaacaatta
61	acacagtgcg	agctgtttct	tagcacgaag	atctcgatgt	ctaagaaacc	aggagggccc
121	ggcaagagcc	gggctgtcaa	tatgctaaaa	cgcggaatgc	cccgcgtggt	gtccttgatt
181	ggactgaaga	gggctatggt	gagcctgac	gacggcaagg	ggccaatacg	atttgtgttg
241	gctctcttgg	cgttcttcag	gttcacagca	attgctccga	cccagagcag	gctggatcga
301	tggagaggtg	tgaacaaaca	aacagcagtg	aaacaccttc	tgagttttta	gaaggaaacta
361	gggaccttga	ccagtgcctat	caatcggcgg	agctcaaaac	aaaagaaaag	aggaggaaaag
421	accggaattg	cagtcagatg	tggcctgac	gccagcgtag	gagcagttac	cctctctaac
481	ttccaaggga	aggtgatgat	gacggtaaat	gctactgacg	tcacagatgt	catcacgatt
541	ccaacagctg	ctggaaagaa	cctatgcatt	gtcagagcaa	tggatgtggg	atacatgtgc
601	gatgatacta	tcacttatga	atgccagtg	ctgtcggctg	gtaatgatcc	agaagacatc
661	gactgttggg	gcacaaagtc	agcagtctac	gtcagggtatg	gaagatgcac	caagacacgc
721	cactcaagac	gcagtcggag	gtcactgaca	gtgcagacac	acggagaaaag	cactctagcg
781	aacaagaagg	gggcttggat	ggacagcacc	aaggccacaa	ggtatttggt	aaaaacagaa
841	tcatggatct	tgaggaaacc	tggatatgcc	ctgggtggcag	ccgtcatttg	ttggatgctt
901	gggagcaaca	ccatgcagag	agttgtgttt	gtcgtgctat	tgcttttggt	ggccccagct
961	tacagcttca	actgccttgg	aatgagcaac	agagacttct	tggaaggagt	gtctggagca
1021	acatgggtgg	atttggttct	cgaaggcgac	agctgcgtga	ctatcatgtc	taaggacaag
1081	cctaccatcg	atgtgaagat	gatgaatatg	gaggcgccca	acctggcaga	ggtccgcagt
1141	tattgtctatt	tggctaccgt	cagcgatctc	tccaccaaag	ctgcgtgccc	gaccatggga
1201	gaagctcaca	atgacaaacg	tgctgaccca	gcttttgtgt	gcagacaagg	agtgtgggac
1261	aggggctggg	gcaacggctg	cggaattatt	ggcaaaggaa	gcattgacac	atgcgccaaa
1321	tttgcttgc	ctaccaaggc	aataggaaga	accatcttga	aagagaatat	caagtacgaa
1381	gtggccattt	ttgtccatgg	accaactact	gtggagtcgc	acggaaacta	ctccacacag
1441	gttggagcca	ctcaggcagg	gagattcagc	atcactcctg	cggcgccttc	atacacacta
1501	aagcttggag	aatatggaga	ggtgacagtg	gactgtgaac	cacggtcagg	gattgacacc
1561	aatgcatact	acgtgatgac	tggttgaaca	aagacgttct	tggtccatcg	tgagtgttcc
1621	atggacctca	acctcccttg	gagcagtgct	ggaagtactg	tgtggaggaa	cagagagacg
1681	ttaatggagt	ttgaggaacc	acacgccacg	aagcagtcgt	tgatagcatt	gggctcacaa
1741	gagggagctc	tgcatcaagc	tttggctgga	gccattcctg	tggaaatttc	aagcaacact
1801	gtcaagttga	cgtcgggtca	tttgaagtgt	agagtgaaga	tggaaaaatt	gcagttgaag
1861	ggaacaacct	atggcgtctg	ttcaaaggct	ttcaagtttc	ttgggactcc	cgcagacaca
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1981	cctatctcgt	cagtggcttc	attgaacgac	ctaacgccag	tgggcagatt	ggtcactgtc
2041	aacccttttg	tttcagtggc	caaggccaac	gctaagggtc	tgattgaatt	ggaaccaccc
2101	tttggagact	catacatagt	ggtgggcaga	ggagaacaac	agatcaatca	ccattggcac
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2281	gggaaggctg	tccatcaagt	gttcggagga	gcattccgct	tactgttcgg	aggcatgtcc
2341	tggataacgc	aaggattgct	gggggtcttc	ctgttgtgga	tgggcatcaa	tgctcgtgat
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2461	gtgcacgctg	acactgggtg	tgccatagac	atcagccggc	aagagctgag	atgtggaagt
2521	ggagtgttca	tacacaatga	tgtggaggct	tggatggacc	gatacaagta	ttaccctgaa
2581	acgccacaag	gcctagccaa	gatcattcag	aaagctcata	aggaaggagt	gtgcggtcta
2641	cgatcagttt	ccagactgga	gcatacaatg	tgggaagcag	tgaaggacga	gctgaacact
2701	cttttgaagg	agaatgggtg	ggaccttagt	gtcgtgggtg	agaaacagga	gggaatgtac
2761	aagtcagcac	ctaaacgcct	caccgccacc	acggaaaaat	tggaaaattg	ctggaaggcc
2821	tggggaaaga	gtattttatt	tgacccagaa	ctcgccaaca	acacctttgt	ggttgatggt
2881	ccggagacca	aggaatgtcc	gactcagaat	cgcgcttgga	atagcttaga	agtggaggat
2941	tttggatttg	gtctcaccag	cactcggatg	ttcctgaagg	tcagagagag	caacacaact
3001	gaatgtgact	cgaagatcat	tggaaacggc	gtcaagaaca	acttggcgat	ccacagtgc
3061	ctgtcctatt	ggattgaaag	caggctcaat	gatacgtgga	agcttgaaaag	ggcagttctg
3121	ggtgaagtca	aatcatgtac	gtggcctgag	acgcatacct	tgtggggcga	tggaatcctt
3181	gagagtgact	tgataatacc	agtcacactg	gcgggaccac	gaagcaatca	caatcggaga

**Complete Nucleotide Sequence of Lineage I WNV Strain 3356 GenBank accession No. AF404756**  
*(Nucleotide positions indicated in bold underline are different than corresponding positions of FIG. 2)*

FIG. 20 b

```

3241 cctgggtaca agacacaaaa ccagggccca tgggacgaag gccgggtaga gattgacttc
3301 gattactgcc caggaactac ggtcaccctg agtgagagct gcggacaccg tggacctgcc
3361 actcgcacca ccacagagag cggaaagtgt ataacagatt ggtgctgcag gagctgcacc
3421 ttaccaccac tgcgctacca aactgacagc ggctgttggg atggtatgga gatcagacca
3481 cagagacatg atgaaaagac cctcgtgcag tcacaagtga atgcttataa tgctgatatg
3541 attgaccctt ttcagtggg ccttctgttc gtgttcttgg ccaccagga ggtccttcgc
3601 aagaggtgga cagccaagat cagcatgcc a gctatactga ttgctctgct agtcctgggtg
3661 tttgggggca ttacttacac tgatgtgtta cgctatgtca tcttgggtggg ggcagctttc
3721 gcagaatcta attcgggagg agacgtggta cacttggcgc tcatggcgac cttcaagata
3781 caaccagtgt ttatgggtgc atcgtttctc aaagcgagat ggaccaacca ggagaacatt
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3901 ctctgggaga tccctgatgt gttgaattca ctggcggtag cttggatgat actgagagcc
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5821 gactttgtta tcacaacaga catatctgaa atgggggcta actttaaggc gagcaggggtg
5881 attgacagcc ggaagagtgt gaaaccaacc atcataacag aaggagaagg gagagtgatc
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6001 agaaatccgt cgcgaagtgg tgatgagtac tgttatgggg ggcacacgaa tgaagacgac
6061 tcgaacttcg ccatttgac tgaggcacga atcatgctgg acaacatcaa catgccaaac
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6301 tgctttgatg gtcctaggac aaacacaatt ttagaagaca acaacgaagt ggaagtcac
6361 acgaagcttg gtgaaaggaa gattctgagg ccgcgctgga ttgacgccag ggtgtactcg

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**Complete Nucleotide Sequence of Lineage I WNV Strain 3356 GenBank accession No. AF404756**  
*(Nucleotide positions indicated in bold underline are different than corresponding positions of FIG. 2)*

FIG. 20 c

```

6421 gatcaccagg cactaaaggc gttcaaggac ttcgcctcgg gaaaacgttc tcagataggg
6481 ctcatgtagg ttctgggaaa gatgcctgag cacttcattg ggaagacatg ggaagcactt
6541 gacaccatgt acgtttgtgg cactgcagag aaaggaggaa gagctcacag aatggccctg
6601 gaggaactgc cagatgctct tcagacaatt gccttgattg ccttattgag tgtgatgacc
6661 atgggagtat tcttcctcct catgcagcgg aagggcattg gaaagatagg tttgggaggc
6721 gctgtcttgg gagtcgcgac ctttttctgt tggatggctg aagttccagg aacgaagatc
6781 gccggaatgt tgctgctctc ccttctcttg atgattgtgc taattcctga gccagagaag
6841 caacgttcgc agacagacaa ccagctagcc gtgttcctga tttgtgtcat gacccttgtg
6901 agcgcagtgg cagccaacga gatgggttgg ctagataaga ccaagagtga cataagcagt
6961 ttgtttgggc aaagaattga ggtcaaggag aatttcagca tgggagagtt tcttctggac
7021 ttgaggccgg caacagcctg gtcactgtac gctgtgacaa cagcggctct cactccactg
7081 ctaaagcatt tgatcacgtc agattacatc aacacctcat tgacctcaat aaacgttcag
7141 gcaagtgcac tattcacact cgcgcgaggc ttccccttcg tcgatgttgg agtgtcggct
7201 ctctgtctag cagccggatg ctggggacaa gtcaccctca ccgttacggt aacagcggca
7261 aactccttt tttgccacta tgcctacatg gttcccggtt ggcaagctga ggcaatgcgc
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7561 tctgtttgga acgcaacaac tgccatcgga ctctgccaca tcatgcgtgg ggggtgtgtg
7621 tcatgtctat ccataacatg gacactcata aagaacatgg aaaaaccagg actaaaaaga
7681 ggtggggcaa aaggacgcac cttgggagag gtttgaaaag aaagactcaa ccagatgaca
7741 aaagaagagt tcaactagta ccgcaaagag gccatcatcg aagtcgatcg ctacagcagc
7801 aaacacgcca ggaaagaagg caatgtcact ggagggcatc cagtctctag gggcacagca
7861 aaactgagat ggctggtcga acggaggttt ctggaaccgg tcggaaaagt gattgacctt
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8341 tgggtgagtc gagcttcagg caatgttgta cattcagtga atatgaccag ccaggtgctc
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8461 ggaagtggaa ccagggcggg gggaaaaccc ctgctcaact cagacaccag taaaatcaag
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8641 tcgctggtca atggagtggg caggctcttc tcaaaacatc gggacaccat cacgaatgtt
8701 accaccatgg ccatgactga cactactccc ttcgggcagc agcgagtgtt caaagagaag
8761 gtggacacga aagctcctga accgccagaa ggagtgaagt acgtgctcaa cgagaccacc
8821 aactggttgt gggcgttttt ggccagagaa aaacgtccga gaatgtgctc tcgagaggaa
8881 ttcataagaa aggtcaacag caatgcagct ttgggtgcca tgtttgaaga gcagaatcaa
8941 tggaggagcg ccagagaggc agttgaagat ccaaaatttt gggagatggg ggatgaggag
9001 cgcgaggcac atctgcgggg ggaatgtcac acttgcattht acaacatgat gggaaagaga
9061 gagaaaaaac ccgagaggtt cggaagggcc aagggaagca gagccatttg gttcatgtgg
9121 ctgggagctc gctttctgga gttcgaggct ctgggttttc tcaatgaaga ccactggctt
9181 ggaagaaaga actcaggagg aggtgtcgag ggcttgggcc tccaaaaact gggttacatc
9241 tgcgtagtag ttggcaccgg gccttggggc aagatctatg ctgatgacac agctggctgg
9301 gacacccgca tcacgagagc tgacttgga aatgaagcta aggtgcttga gctgcttgat
9361 ggggaacatc ggcgtcttgc cagggccatc attgagctca cctatcgtca caaagtgtg
9421 aaagtgatgc gcccggtgct tgatggaaga accgtcatgg atgttatctc cagagaagat
9481 cagaggggga gtggacaagt tgtcacctac gccctaaaca ctttcaccaa cctggccgctc
9541 cagctggtga ggatgatgga aggggaagga gtgattggcc cagatgatgt ggagaaactc
9601 acaaaaggga aaggacccaa agtcaggacc tggctgtttg agaattggga agaaagactc

```

**Complete Nucleotide Sequence of Lineage I WNV Strain 3356 GenBank accession No. AF404756**  
*(Nucleotide positions indicated in bold underline are different than corresponding positions of FIG. 2)*

FIG. 20 d

```

9661 agccgcatgg ctgtcagtgg agatgactgt gtggtaaagc ccctggacga tcgctttgcc
9721 acctcgctcc acttcctcaa tgctatgtca aagggttcga aagacatcca agagtggaaa
9781 ccgtcaactg gatggtatga ttggcagcag gttccatttt gctcaaacca tttacttgaa
9841 ttgatcatga aagatggaag aacactgggtg gttccatgcc gaggacagga tgaattggta
9901 ggcagagctc gcatatctcc aggggcccga tggaaactcc gcgacactgc ttgtctggct
9961 aagtcttatg cccagatgtg gctgcttctg tacttccaca gaagagacct gcggctcatg
10021 gccaacgcca tttgctccgc tgctccctgtg aattgggtcc ctaccggaag aaccacgtgg
10081 tccatccatg caggaggaga gtggatgaca acagaggaca tggtggaggt ctggaaccgt
10141 gtttgatag aggagaatga atggatggaa gacaaaaccc cagtggagaa atggagtgc
10201 gtcccatatt caggaaaacg agaggacatc tgggtgtggca gcctgattgg cacaagagcc
10261 cgagccacgt gggcagaaaa catccagggtg gctatcaacc aagtcagagc aatcatcgga
10321 gatgagaagt atgtggatta catgagttca ctaaagagat atgaagacac aactttggtt
10381 gaggacacag tactgtagat atttaataca ttgtaaatag acaatataag tatgcataaa
10441 agtgtagttt tatagtagta tttagtgggt ttagtgtaaa tagttaagaa aattttgagg
10501 agaaagtcag gccgggaagt tcccgccacc ggaagttgag tagacggtgc tgcctgcgac
10561 tcaaccccag gaggactggg tgaacaaagc cgcaagtga tccatgtaag ccctcagaac
10621 cgtctcgga gaggagcccc acatgttgta acttcaaagc ccaatgtcag accacgctac
10681 ggcgtgctac tctgcggaga gtgcagtctg cgatagtgcc ccaggaggac tgggttaaca
10741 aaggcaaacc aacgcccac gcggccctag ccccggtaat ggggttaacc agggcgaaag
10801 gactagaggt tagaggagac cccgcggttt aaagtgcacg gccagcctg gctgaagctg
10861 taggtcaggg gaaggactag aggttagtgg agaccccggt ccacaaaaca ccacaacaaa
10921 acagcatatt gacacctggg atagactagg agatcttctg ctctgcacaa ccagccacac
10981 ggcacagtgc gccgacaatg gtggctgggt gtgcgagaac acaggatct
//

```

**C mplete Nucleotide Sequence f Fully-Infecti us Lineage I WNV cDNA Cl ne of Strain 3356**  
*(Nucleotide positions different from FIG. 20 are shown in bold underline)*

FIG. 21 a

```

1      agtagttcgc ctgtgtgagc tgacaaactt agtagtgttt gtgaggatta acaacaatta
61     acacagtgcg agctgtttct tagcacgaag atctcgatgt ctaagaaacc aggagggccc
121    ggcaagagcc gggctgtcaa tatgctaaaa cgcggaatgc cccgcgtggt gtccttgatt
181    ggactgaaga gggctatggt gagcctgatc gacggcaagg ggccaatacg atttgtgttg
241    gctctcttgg cgttcttcag gttcacagca attgctccga cccgagcagt gctggatcga
301    tggagaggtg tgaacaaaca aacagcgatg aaacaccttc tgagttttaa gaaggaacta
361    gggaccttga ccagtgttat caatcggcgg agctcaaaac aaaagaaaag aggaggaaag
421    accggaattg cagtcatgat tggcctgatc gccagcgtag gagcagttac cctctctaac
481    ttccaaggga aggtgatgat gacggtaaat gctactgacg tcacagatgt catcacgatt
541    ccaacagctg ctggaagaa cctatgcatt gtcagagcaa tggatgtggg atacatgtgc
601    gatgatacta tcacttatga atgcccagtg ctgtcggctg gtaatgatcc agaagacatc
661    gactgttggg gcacaaagtc agcagcttac gtcaggatg gaagatgcac caagacacgc
721    cactcaagac gcagtcggag gtcactgaca gtgcagacac acggagaaag cactctagcg
781    aacaagaagg gggcttggat ggacagcacc aaggccacaa ggtatttggg aaaaacagaa
841    tcatggatct tgaggaaccc tggatatgcc ctgggtggcag ccgtcattgg ttggatgctt
901    gggagcaaca ccatgcagag agttgtgttt gtcgtgctat tgcttttggg gggcccgact
961    tacagcttca actgccttgg aatgagcaac agagacttct tggaaggagt gctctggagca
1021   acatgggttg atttggttct cgaaggcgac agctgcgtga ctatcatgtc taaggacaag
1081   cctaccatcg atgtgaagat gatgaatatg gaggcggcca acctggcaga ggtccgcagt
1141   tattgctatt tggctaccgt cagcgatctc tccaccaaag ctgcgtgccg gaccatggga
1201   gaagctcaca atgacaaacg tgctgacca gcttttgtgt gcagacaagg agtggaggac
1261   aggggctggg gcaacggctg cggaCtattt ggcaaaggaa gcattgacac atgcgccaaa
1321   tttgcctgct ctaccaaggc aataggaaga accatcttga aagagaatat caagtacgaa
1381   gtggccattt ttgtccatgg accaactact gtggagtcgc acggaaacta ctccacacag
1441   gttggagcca ctcaggcagg gagattcagc atcactcctg cggcgccctc atacacacta
1501   aagcttggag aatatggaga ggtgacagtg gactgtgaac cacggtcagg gattgacacc
1561   aatgcatact acgtgatgac tgttggaaac aagacgttct tgggccatcg tgagtgggtc
1621   atggacctca acctcccttg gagcagtgct ggaagtactg tgtggaggaa cagagagacg
1681   ttaatggagt ttgaggaacc acacgccacg aagcagctct tgatagcatt gggctcacia
1741   gagggagctc tgcatcaagc tttggctgga gccattcctg tggaaatttc aagcaacact
1801   gtcaagttga cgtcgggtca tttgaagtgt agagtgaaga tggaaaaatt gcagtgaag
1861   ggaacaacct atggcgtctg ttcaaaggct ttcaagtttc ttgggactcc cgcagacaca
1921   ggtcacggca ctgtggtgtt ggaattgcag tacactggca cggatggacc ttgtaaagtt
1981   cctatctcgt cagtggcttc attgaacgac ctaacgccag tgggcagatt ggtcactgtc
2041   aacccttttg ttcagtggc cagggccaac gctaaggctc tgattgaatt ggaaccacc
2101   tttggagact catacatagt ggtgggcaga ggagaacaac agatcaatca ccatggcac
2161   aagtcctgga gcagcattgg caaagccttt acaaccacc tcaaaggagc gcagagacta
2221   gccgctctag gagacacagc ttgggacttt ggatcagttg gaggggtgtt cacctcagtt
2281   gggaaaggctg tccatcaagt gttcggagga gcattccgct tactgttcgg aggcattgtc
2341   tggataacgc aaggattgct gggggctctc ctgttgtgga tgggcatcaa tgctcgtgat
2401   aggtccatag ctctcacggt tctcgcagtt ggaggagttc tgctcttcct ctccgtgaac
2461   gtgcacgctg aactgggtg tgccatagac atcagccggc aagagctgag atgtggaagt
2521   ggagtgttca tacacaatga tgtggaggct tggatggacc gatacaagta ttaccctgaa
2581   acgccacaag gcctagccaa gatcattcag aaagctcata aggaaggagt gtgcggtcta
2641   cgatcagttt ccagactgga gcatcaaag tgggaagcag tgaaggacga gctgaacact
2701   cttttgaagg agaattggtg ggaccttagt gtcgtggttg agaaacagga ggaattgtac
2761   aagtcagcac ctaaagcct caccgccacc acggaaaaat tggaaattgg ctggaaggcc
2821   tggggaaaga gtattttatt tgcaccagaa ctgcgcaaca acacctttgt ggttgatggt
2881   ccggagacca aggaatgtcc gactcagaat cgcgcttgga atagcttaga agtggaggat
2941   tttggatttg gtctcaccag cactcggatg ttctgaagg tcagagagag caacacaact
3001   gaatgtgact cgaagatcat tggaaaggct gtcaagaaca acttggcgat ccacagtgc
3061   ctgtcctatt ggattgaaag caggctcaat gatacgtgga agcttgaaag ggcagttctg
3121   ggtgaagtca aatcatgtac gtggcctgag acgcatacct tgtggggcga tggaaacctt
3181   gagagtgact tgataatacc agtcacactg gcgggaccac gaagcaatca caatcggaga

```



**Complete Nucleotide Sequence of Fully-Infectious Lineage I WNV cDNA Clone of Strain 3356**  
*(Nucleotide positions different from FIG. 20 are shown in bold underline)*

FIG. 21 b

```

3241 cctgggtaca agacacaaaa ccagggccca tgggacgaag gccgggtaga gattgacttc
3301 gattactgcc caggaactac ggtcaccctg agtgagagct gcggacaccg tggacctgcc
3361 actcgacca ccacagagag cggaaagtgt ataacagatt ggtgctgcag gagctgcacc
3421 ttaccaccac tgcgctacca aactgacagc ggctgttggt atggtatgga gatcagacca
3481 cagagacatg atgaaaagac cctcgtgcag tcacaagtga atgcttataa tgctgatatg
3541 attgaccctt ttcagtggg ccttctggtc gtgttcttgg ccaccaggga ggtccttcgc
3601 aagaggtgga cagccaagat cagcatgcca gctatactga ttgctctgct agtcctggtg
3661 tttgggggca ttacttacac tgatgtgtta cgctatgtca tcttggtggg ggcagctttc
3721 gcagaatcta attcgggagg agacgtggta cacttggcgc tcatggcgac cttcaagata
3781 caaccagtgt ttatggtggc atcgtttctc aaagcgagat ggaccaacca ggagaacatC
3841 ttgttgatgt tggcggctgt tttctttcaa atggcttatc acgatgcccg ccaaattctg
3901 ctctgggaga tccctgatgt gttgaattca ctggcggtag cttggatgat actgagagcc
3961 ataacattca caacgacatc aaacgtggtt gttccgctgc tagccctgct aacaccggg
4021 ctgagatgct tgaatctgga tgtgtacagg atactgctgt tgatggctcg aataggcagc
4081 ttgatcaggg agaagaggag tgcagctgca aaaaagaaag gagcaagtct gctatgcttg
4141 gctctagcct caacaggact tttcaacccc atgatccttg ctgctggact gttacatgt
4201 gatcccaacc gtaaacgcgg atggcccga actgaagtga tgacagctgt cggcagctag
4261 tttgccatcg tcggagggct ggcagagctt gacattgact ccatggccat tccaatgact
4321 atcgcggggc tcatgtttgc tgctttctgt atttctggga aatcaacaga tatgtggatt
4381 gagagaacgg cggacatttc ctgggaaagt gatgcagaaa ttacaggctc gagcgaaaga
4441 gttgatgtgc ggcttgatga tgatggaaac ttccagctca tgaatgatcc aggagcacct
4501 tggaagatat ggatgctcag aatggctctgt ctcgcgatta gtgcgtacac cccctgggca
4561 atcttgccct cagtgttggt attttgata actctccaat acacaaagag aggagggctg
4621 ttgtgggaca ctccctcacc aaaggagtac aaaaaggggg acacgaccac cggcgcttac
4681 aggatcatga ctctgggct gctcggcagt tatcaagcag gagcgggctg gatggttgaa
4741 ggtgttttcc acaccctttg gcatacaaa aaaggagccg ctttgatgag cggagagggc
4801 cgctgggacc catactgggg cagtgtcaag gaggatcgac tttgttacgg aggaccctgg
4861 aaattgcagc acaagtggaa cgggcaggat gaggtgcaga tgattgtggt ggaacctggc
4921 aagaacgtta agaacgtcca gacgaaacca ggggtgttca aaacacctga aggagaaatc
4981 ggggcoctga ctttgactt cccactgga acatcaggct caccaatagt ggacaaaaac
5041 ggtgatgtga ttgggcttta tggcaatgga gtcataatgc ccaacggctc atacataagc
5101 gcgatagtgc aggtgaaaag gatggatgag ccaatcccag ccggattcga acctgagatg
5161 ctgaggaaaa aacagatcac tgtactggat ctccatcccg gcgcgggtaa aacaaggagg
5221 attctgccac agatcatcaa agaggccata aacagaagac tgagaacagc cgtgctagca
5281 ccaaccaggg ttgtggctgc tgagatggct gaagcactga gaggactgcc catccggtac
5341 cagacatccg cagtggccag agaacataat ggaaatgaga ttgttgatgt catgtgtcat
5401 gctaccctca cccacaggct gatgtctcct cacagggtgc cgaactacaa cctgttcgtg
5461 atggatgagg ctcatctcac cgaccagct agcattgcag caagagggtta catttccaca
5521 aaggctcagc taggggaggc ggcggcaata ttcatgacag ccacccacc aggcaactca
5581 gatccattcc cagagtccaa ttcaccaatt tccgacttac agactgagat cccggatcga
5641 gcttggaact ctggatacga atggatcaca gaatacaccc ggaagacggt ttggtttgtg
5701 cctagtgtca agatggggaa tgagattgcc ctttgccctac aacgtgctgg aaagaaaagta
5761 gtccaattga acagaaagtc gtacgagacg gactacccaa aatgtaagaa cgtatgattg
5821 gactttgtta tcacaacaga catatctgaa atgggggcta actttaaggc gagcaggggtg
5881 attgacagcc ggaagagtgt gaaaccaacc atcataacag aaggagaagg gagatgatac
5941 ctggggagaac catctgcagt gacagcagct agtgccgccc agagacgtgg acgtatcggt
6001 agaaatccgt cgcaagtgg tgatgagtac tggtatgggg ggcacacgaa tgaagacgac
6061 tcgaacttcg ccatttgac tgaggcacga atcatgctgg acaacatcaa catgccaaac
6121 ggactgatcg ctcaattcta ccaaccagag cgtgagaagg tatataccat ggtggggaa
6181 taccggctca gaggagaaga gagaaaaaac tttctggaac tggtgaggac tgcagatctg
6241 ccagtttggc tggcttaciaa ggttgacgag gctggagtgt cataccacga ccggagggtg
6301 tgctttgatg gtcctaggac aaacacaatt ttagaagaca acaacgaagt ggaagtcac
6361 acgaagcttg gtgaaaggaa gattctgagg ccgcgctgga ttgacgccag ggtgtactcg

```

**Complete Nucleotide Sequence of Fully-Infectious Lineage I WNV cDNA Clone of Strain 3356**  
(Nucleotide positions different from FIG. 20 are shown in bold underline)

FIG. 21 c

```

6421 gatcaccagg cactaaaggc gttcaaggac ttgcctcgg gaaaacgttc tcagataggg
6481 ctcattgagg ttctgggaaa gatgcctgag cacttcatgg ggaagacatg ggaagcactt
6541 gacaccatgt acgttgtggc cactgcagag aaaggaggaa gagctcacag aatggccctg
6601 gaggaactgc cagatgctct tcagacaatt gccttgattg ccttattgag tgtgatgacc
6661 atgggagtat tcttcctcct catgcagcgg aagggcattg gaaagatagg tttgggaggc
6721 gctgtcttgg gagtcgcgac ctttttctgt tggatggctg aagttccagg aacgaagatc
6781 gccggaatgt tgctgctctc ctttctctgt atgattgtgc taattcctga gccagagaag
6841 caacgttcgc agacagacaa ccagctagcc gtgttcctga tttgtgtcat gacccttggtg
6901 agcgcagtg cagccaacga gatgggttgg ctagataaga ccaagagtga cataagcagt
6961 ttgtttgggc aaagaattga ggtcaaggag aatttcagca tgggagagtt tcttTtggac
7021 ttgaggccgg caacagcctg gtcactgtac gctgtgacaa cagcggctct cactccactg
7081 ctaaagcatt tgatcacgtc agattacatc aacacctcat tgacctcaat aaacgttcag
7141 gcaagtgcac tattcacact cgcgcgaggg tccccctcg tcgatgttgg agtgctcggct
7201 ctctgctag cagccggatg ctggggacaa gtcacctca ccgttacggt aacagcggca
7261 aactccttt ttggcacta tgcctacatg gttcccgtt ggcaagctga ggcaatgcgc
7321 tcagcccagc ggcgacagc ggccggaatc atgaagaacg ctgtagtgga tggcatcgtg
7381 gccacggacg tcccagaatt agagcgcacc acacccatca tgcagaagaa agttggacag
7441 atcatgtcga tcttggtgtc tctagctgca gtagtagtga acccgtctgt gaagacagta
7501 cgagaagccg gaattttgat cacggccgca gcggtgacgc tttgggagaa tggagcaagc
7561 tctgtttgga acgcaacaac tgccatcgga ctctgccaca tcatgcgtgg gggttggttg
7621 tcatgtctat ccataacatg gacactcata aagaacatgg aaaaaccagg actaaaaaga
7681 ggtggggcaa aaggacgcac cttgggagag gtttggaag aaagactcaa ccagatgaca
7741 aaagaagagt tactaggta ccgcaaagag gccatcatcg aagtcgatcg ctcagcagca
7801 aaacacgcca ggaaagaagg caatgCact ggagggcatc cagtctctag gggcacagca
7861 aaactgagat ggctggtcga acggaggttt ctggaaccgg tcggaaaagt gattgacctt
7921 ggatgtggaa gaggcggttg gtgttactat atggcaacc aaaaagagt ccaagaagtc
7981 agagggtaaca caaaggcggt tcccggacat gaagagcccc aactagtga aagtatatgga
8041 tggaaacattg tcaccatgaa gagtggAgtg gatgtgttct acagaccttc tgagtgttgt
8101 gacaccctcc tttgtgacat cggagagtcc tcgtcaagtg ctgaggttga agagcatagg
8161 acgattcggg tccttgaaat ggttgaggac tggctgcacc gagggccaag ggaattttgc
8221 gtgaaggtgc tctgcccta catgccgaaa gtcatagaga agatggagct gctccaacgc
8281 cggtatgggg ggggactggt cagaaaccca ctctcacgga attccacgca cgagatgtat
8341 tgggtgagtc gagcttcagg caatgtggtg cattcagtga atatgaccag ccaggtgctc
8401 ctaggaagaa tggaaaaaag gacctggaag ggaccccaat acgaggaaga tgtaacttg
8461 ggaagtggaa ccaggcggtt gggaaaaacc ctgctcaact cagacaccag taaaatcaag
8521 aacaggtattg aacgactcag gcgtgagtac agttcgacgt ggcaccacga tgagaaccac
8581 ccatatagaa cctggaacta ctacggcagt tatgatgtga agcccacagg ctccgccagt
8641 tcgctggtca atggagtgg caggctcttc tcaaaacat gggacaccat cacgaatgtt
8701 accaccatgg ccatgactga cactactccc ttcgggcagc agcgagtgtt caaagagaag
8761 gtggacacga aagctcctga accgccagaa ggagtgaagt acgtgctcaa cgagaccacc
8821 aactggttgt gggcgttttt ggccagagaa aaacgtccAa gGatgtgctc tcgagaggaG
8881 ttcataagaa aggtcaacag caatgcagct ttgggtgccg tgtttgaaga gcagaatcaa
8941 tggaggagcg ccagagaggc agttgaagat ccaaaatttt gggagatggt ggatgaggag
9001 cgcgaggcac atctgcgggg ggaatgtcac acttgcattht acaacatgat gggaaaagaga
9061 gagaaaaaac ccgagaggtt cggaaaaggc aagggaaagca gagccatttg gttcatgtgg
9121 Tgctttctgga gttcagggct ctgggttttc tcaatgaaga ccactggctt
9181 ggaagaaaga actcaggagg aggtgtcgag ggcttggggc tccaaaaact gggttacatc
9241 ctgctggaag ttggcaccgg gcctgggggc aagatctatg ctgatgacac agctggctgg
9301 gacaccgca tcacgagagc tgacttgga aatgaagcta aggtgcttga gctgcttgat
9361 ggggaacatc ggcgtcttgc cagggccatc attgagctca cctatcgtca caaagtgtgtg
9421 aaagtgatgc gcccggttgc tgatggaaga accgtcatgg atgttatctc cagagaagat
9481 cagaggggga gtggacaagt tgtcacctac gccctaaaca ctttcaccaa cctggccgtc
9541 cagctggtga ggatgatgga aggggaagga gtgattggcc cagatgatgt ggagaaactc
9601 acaaaaggga aaggacccaa agtcaggacc tggctgtttg agaatgggga agaaagactc

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**C mplete Nucleotide Sequence of Fully-Infectious Lineage I WNV cDNA Clone f Strain 3356**  
*(Nucleotide positions different from FIG. 20 are shown in bold underline)*

FIG. 21 d

```

9661 agccgcatgg ctgtcagtgg agatgactgt gtggtaaagc ccctggacga tcgctttgcc
9721 acctcgctcc acttcctcaa tgctatgtca aagggttcgca aagacatcca agagtggaaa
9781 ccgtcaactg gatggtatga ttggcagcag gttccatttt gctcaaacca ttctactgaa
9841 ttgatcatga aagatggaag aacactgggtg gttccatgcc gaggacagga tgaattggta
9901 ggcagagctc gcatatctcc aggggcccga tggaaacgtcc gcgacactgc ttgtctggct
9961 aagtcttatg cccagatgtg gctgcttctg tacttccaca gaagagacct gcggctcatg
10021 gccaacgcca ttgtctccgc tgtccctgtg aattgggtcc ctaccggaag aaccacgtgg
10081 tccatccatg caggaggaga gtggatgaca acagaggaca tggtggaggt ctggaaccgt
10141 gtttgatag aggagaatga atggatggaa gacaaaaccc cagtggagaa atggagtgc
10201 gtcccatatt caggaaaacg agaggacatc tgggtgtggca gcctgattgg cacaagagcc
10261 cgagccacgt ggcagaaaa catccaggtg gctatcaacc aagtcagagc aatcatcgga
10321 gatgagaagt atgtggatta catgagttca ctaaagagat atgaagacac aactttggtt
10381 gaggacacag tactgtagat atttaataca ttgtaaatag acaatataag tatgcataaa
10441 agttagtatt tatagtagta tttagtgggtg ttagtgtaaa tagttaagaa aattttgagg
10501 agaaagtcag gccgggaagt tcccgccacc ggaagttgag tagacgggtgc tgcctgcgac
10561 tcaaccccag gaggactggg tgaacaaagc cgcgaagtga tccatgtaag ccTtcagaac
10621 cgtctcgga ggaggacccc acatgttgta acttcaaagc ccaatgtcag accacgctac
10681 ggcgtgctac tctgcggaga gtgcagtctg cgatagtgcc ccaggaggac tgggttaaca
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//

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